BUBBLE GENERATING ASSEMBLY

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BACKGROUND OF THE INVENTION

1. Related Cases

This is a continuation-in-part of co-pending Serial No. 10/133,195, entitled "Apparatus and Method for Delivering Bubble Solution to a Dipping Container", filed April 26, 2002, which is in turn a continuation-in-part of co-pending Serial No. 10/099,431, entitled "Apparatus and Method for Delivering Bubble Solution to a Dipping Container", filed March 15, 2002, whose disclosures are incorporated by this reference as though fully set forth herein.

2. Field of the Invention

The present invention relates to bubble toys, and in particular, to a bubble generating assembly which automatically forms a bubble film over a bubble ring without the need to dip the bubble ring into a container or a dish of bubble solution.

3. Description of the Prior Art

Bubble producing toys are very popular among children who enjoy producing bubbles of different shapes and sizes. Many bubble producing toys have previously been provided. Perhaps the simplest example has a stick with a circular opening or ring at one end, resembling a wand. A bubble solution film is produced when the ring is dipped into a dish that holds bubble solution or bubble producing fluid (such as soap) and then removed therefrom. Bubbles are then formed by blowing carefully against the film. Such a toy requires dipping every time a bubble is to created, and the bubble solution must accompany the wand from one location to another.

Recently, the market has provided a number of different bubble generating assemblies that are capable of producing a plurality of bubbles. Examples of such assemblies are illustrated in U.S. Patent Nos. 6,149,486 (Thai), 6,331,130 (Thai) and 6,200,184 (Rich et al.). The bubble rings in the bubble generating assemblies in U.S. Patent Nos. 6,149,486 (Thai), 6,331,130 (Thai) and 6,200,184 (Rich et al.) need to be dipped into a dish that holds bubble solution to produce films of bubble solution across the rings. The motors in these assemblies are then actuated to generate air against the films to produce bubbles.

All of these aforementioned bubble generating assemblies require that one or more bubble rings be dipped into a dish of bubble solution. In particular, the child

must initially pour bubble solution into the dish, then replenish the solution in the dish as the solution is being used up. After play has been completed, the child must then pour the remaining solution from the dish back into the original bubble solution container. Unfortunately, this continuous pouring and re-pouring of bubble solution from the bottle to the dish, and from the dish back to the bottle, often results in unintended spillage, which can be messy, dirty, and a waste of bubble solution.

Thus, there remains a need to provide an apparatus and method for forming a film of bubble solution across a bubble ring without the need to dip the bubble ring into a dish of bubble solution.

SUMMARY OF THE DISCLOSURE

It is an object of the present invention to provide an apparatus and method for effectively forming a film of bubble solution across a bubble ring.

It is another object of the present invention to provide an apparatus and method for effectively forming a film of bubble solution across a bubble ring in a manner which minimizes spillage of the bubble solution.

It is yet another object of the present invention to provide an apparatus having a simple construction that effectively forms a film of bubble solution across a bubble ring.

It is yet a further object of the present invention to provide an apparatus and method for effectively forming films of bubble solution across a plurality of bubble rings.

The objectives of the present invention are accomplished by providing a bubble generating assembly having a housing, a container coupled to the housing and retaining bubble solution, a trigger mechanism, a pair of bubble generating rings, a tubing that couples the interior of the container with the rings, and a link assembly that couples the trigger mechanism and the rings in a manner in which actuation of the trigger mechanism causes the rings to be pivoted. Each ring is pivotably coupled to each other in a manner such that the rings can be pivoted between a closed position where the front surfaces of the rings contact each other, and an opened position where the rings are positioned side-by-side in the same plane.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a bubble generating assembly according to one embodiment of the present invention shown with the two bubble rings contacting each other.

FIG. 2 is another perspective view of the assembly of FIG. 1 shown with the two bubble rings positioned side by side with each other.

FIG. 3 is a front view of the assembly of FIG. 1 shown with the two bubble rings positioned side by side with each other.

FIG. 4 is a cross-sectional view of the assembly of FIG. 1 shown with the two bubble rings contacting each other.

FIG. 5 is a cross-sectional view of the assembly of FIG. 1 shown with the two bubble rings positioned side by side with each other.

FIG. 6 is an exploded view illustrating the internal components of the assembly of FIG. 1.

FIG. 7 is an exploded view of a bubble ring that can be used with the assembly of FIG. 1.

FIG. 8 is an isolated and enlarged perspective view of the link system of the assembly of FIG. 1 shown with the two bubble rings contacting each other.

FIG. 9 is an isolated and enlarged perspective view of the link system of the assembly of FIG. 1 shown with the two bubble rings positioned side by side with each other.

FIG. 10 is an isolated and top plan view of the link system of the assembly of FIG. 1 shown with the two bubble rings contacting each other.

FIG. 11 is an isolated and top plan view of the link system of the assembly of FIG. 1 shown with the two bubble rings positioned side by side with each other.

FIG. 12 is an isolated top plan view illustrating the relationship between the pressure rollers and the tube when the assembly of FIG. 1 is in the normal non-operational condition.

FIG. 13 is an isolated top plan view illustrating the relationship between the pressure rollers and the tube when the assembly of FIG. 1 is in the bubble-generating position.

FIG. 14 is a cross-sectional view of a bubble generating assembly according to another embodiment of the present invention shown with the two sets of bubble rings positioned side by side with each other.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following detailed description is of the best presently contemplated modes of carrying out the invention. This description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating general principles of embodiments of the invention. The scope of the invention is best defined by the appended claims. In certain instances, detailed descriptions of well-known devices and mechanisms are omitted so as to not obscure the description of the present invention with unnecessary detail.

FIGS. 1-13 illustrate one embodiment of a bubble generating assembly 20 according to the present invention. The assembly 20 has a housing 22 that includes a bottom or handle section 24 and an upper or bubble generating section 26. The housing 22 can be provided in the form of two symmetrical outer shells that are connected together by, for example, screws or welding or glue. These outer shells together define a hollow interior for housing the internal components of the assembly 20, as described below. The handle section 24 has an opening 28 through which a user can extend his or her fingers to grip the handle section 24. The front wall 30 of the opening 28 defines a shielding wall against which a conventional bubble solution bottle 32 can be rested. The bubble solution bottle 32 can be provided in the form of any of the conventional bubble solution containers that are currently available in the marketplace. A connecting section 34, which resembles an annular wall, extends from the front of the top of the front wall 30, and has internal threads 36 (see also FIGS. 4 and 5) that are adapted to releasably engage the external threads 38 on the neck of the solution bottle 32. A solution dish 40 is secured to the top of the connecting section 34, and has a first opening 42 that communicates with the interior of the connecting section 34. The dish 40 also has a second opening 44 that communicates with the interior of the connecting section 34, and which receives a tube 46 that extends therethrough from the solution bottle 32 to the bubble generating section 26.

The handle section 24 houses a power source 48 which can include at least one conventional battery. The bubble generating section 26 has a motor housing 49 that houses a motor 50 that is electrically coupled to the power source 48 via a first wire 52 and a first electrical contact 54. A second wire 56 couples the motor 50 to a first end 58 of a second electrical contact 60, whose second curved end 62 is

adapted to releasably contact a third electrical contact 64 that is coupled to the power supply 48. The second contact 60 is attached to the bottom leg 72 of a push button 66, which operates as a trigger mechanism.

The push button 66 is positioned at a rear side of the housing 22 between the handle section 24 and the bubble generating section 26, and extends through an opening 68 in the housing 22. Referring also to FIG. 6, the push button 66 has a generally L-shaped configuation with a bottom leg 72 and an elongated leg 74. A stepped extension 76 extends from the inner side of the elongated leg 74, and has a lower edge 78 and an upper edge 80 that are connected by an angled edge 82. The top end of the elongated leg 74 has a pivot opening 84 that receives a pivot shaft 86 (see FIGS. 4 and 5). A curved bar 88 extends from the top end of the elongated leg 74, and has a pivot opening 90 at its terminal end that receives a sliding shaft 92 (see FIGS. 4, 5, 8 and 9). The sliding shaft 92 is retained for reciprocating sliding movement inside a straight groove 94 of a locking piece 96 that is sleeved over a locking rack 98 (see also FIGS. 8-11). A shaft 99 (see FIG. 8) is attached to the locking piece 96 and extends in the interior of the locking rack 98, and a resilient element 70 (such as a spring) is retained over the shaft 99. The resilient element 70 normally biases the locking piece 96 towards a forward end 100 of the locking rack 98. As the locking piece 96 moves back and forth along the outer surface of the locking rack 98, the sliding shaft 92 slides up and down along the groove 94 (compare FIGS. 8 and 9) in a direction perpendicular to the direction of movement of the locking piece 96. The push button 66 is normally biased outwardly away from the housing 22 by the resilient element 70 which biases the locking piece 96 towards the forward end 100 of the locking rack 98. This causes the sliding shaft 92 to slide downwardly (see FIGS. 4 and 8) in the groove 94, which causes the bar 88 and the push button 66 to pivot in a counter-clockwise direction (as viewed from the orientation of FIGS. 4 and 5) about the pivot shaft 86, biasing the push button 66 outwardly away from the housing 22. As a result, the bias of the push button 66 means that the second contact 60 carried on the push button 66 is also normally biased away from the third contact 64 so that the motor 50 is not powered by the power source 48 under normal (non-operation) circumstances.

A pair of bubble generating rings 110 and 112 are provided outside the housing 22, and are adapted to be moved between a closed position (see FIGS. 1, 4 and 8), in which the front surfaces 126 of both rings 110, 112 contact each other, to

an opened position (see FIGS. 2, 5 and 9), in which the rings 110, 112 are positioned side-by-side in the same plane. Each ring 110 and 112 can be identical in structure and operation, so only one ring 110 is illustrated in FIG. 7. The ring 110 has an annular base piece 114 that has a cylindrical wall 116 extending therein to define an annular chamber 118 therein. An opening 120 is provided in the base piece 114. The ring 110 also has an annular cover piece 122 that fits into the annular chamber 118 of the base piece 114. A plurality of outlets 124 can be provided along the inner annular surface, and/or the front surface 126, of the cover piece 122. Respective tubings 131 and 133 (see FIG. 6) are attached to the opening 120 of each ring 110, 112, to deliver bubble solution from the solution bottle 32 via the tube 46 into the chambers 118 of the respective rings 110, 112. The bubble solution from the chambers 118 can then leak out of the outlets 124 onto the front surface 126 of the rings 110, 112. When the bubble rings 110, 112 are in their normal non-operating (i.e., closed) position, the contact between the front surfaces 126 of the bubble rings 110, 112 will cause a film of bubble solution to be formed across each bubble ring 110, 112.

FIGS. 4-6 and 8-11 illustrate the link system that operatively couples the push button 66 to the bubble rings 110, 112. The link system includes the push button 66, the locking piece 96, the locking rack 98, a control bar 130, a generally U-shaped pivoting bar 132, and a ring support 134 and 136 for each respective bubble ring 110 and 112, respectively. The link system causes the bubble rings 110, 112 to move between the opened and closed positions when the push button 66 is pressed and released, respectively. The pivoting bar 132, the ring supports 134 and 136, and the rings 110, 112 are positioned outside the housing 22, while the control bar 130 is positioned partially outside the housing 22.

Referring to FIG. 6, the U-shaped pivoting bar 132 has a central section 142 that has an opening 144 through which the motor 50 can extend. A curved upper section 146 extends from one end of the central section 142, and a curved lower section 148 extends from one end of the central section 142. The control bar 130 is a straight bar that extends from a location along the upper section 146. The control bar 130 has a groove 150 through which the curved bar 88 of the push button 66 extends. An upper U-shaped prong 156 extends from the top end of the upper section 146, the upper U-shaped prong 156 having a first leg 158 and a second leg 160. Each leg 158 and 160 has a rounded end that has a corresponding elongated

opening 162 and 164, respectively. Similarly, a lower U-shaped prong 166 extends from the bottom end of the lower section 148, the lower U-shaped prong 166 having a first leg 168 and a second leg 170. Each leg 168 and 170 has a rounded end that has a corresponding elongated opening 172 and 174, respectively.

As best seen in FIGS. 3 and 6, the ring supports 134 and 136 are elongated shafts that are positioned adjacent and parallel to each other along their inner sides. The ring 110 is attached to the center of, and along the outer side of, the ring support 134. Similarly, the ring 112 is attached to the center of, and along the outer side of, the ring support 136. Thus, the two rings 110, 112 extend away from the ring supports 134, 136, but are essentially positioned side-by-side to each other so that one ring 110 can be pivoted to completely cover the other ring 112, and vice versa. An upper rounded opening 188 is provided in an extension 190 that extends from the top of the ring support 134 at an orientation that is perpendicular to the ring support 134, and a lower rounded opening 192 is provided in another extension 194 that extends from the bottom of the ring support 134 at an orientation that is perpendicular to the ring support 134. Protrusions 196 and 198 are provided adjacent the openings 188 and 192, respectively, in the extensions 190 and 194, respectively, and extend towards each other in a direction parallel to the ring support 134. Similarly, an upper rounded opening 200 is provided in an extension 202 that extends from the top of the ring support 136 at an orientation that is perpendicular to the ring support 136, and a lower rounded opening 204 is provided in another extension 206 that extends from the bottom of the ring support 136 at an orientation that is perpendicular to the ring support 136. Protrusions 208 and 210 are provided adjacent the openings 200 and 204, respectively, in the extensions 202 and 206, respectively, and extend towards each other in a direction parallel to the ring support 136. An upper pivot shaft 216 extends through the upper openings 188 and 200 of the ring supports 134 and 136, respectively, and a lower pivot shaft 218 extends through the lower openings 192 and 204 of the ring supports 134 and 136, respectively, so that the two ring supports 134 and 136 can pivot with respect to each other about a pivot axis defined by the pivot shafts 216 and 218. The pivot shafts 216 and 218 are pivotably secured to fixed locations 240 and 242, respectively, of the housing 22. In addition, the protrusions 196 and 208 are retained in the openings 162 and 164, respectively, so that the upper ends of the ring supports 134 and 136 are coupled for pivoting movement with respect to the upper section 146 of

the U-shaped bar 132. Similarly, the protrusions 198 and 210 are retained in the openings 172 and 174, respectively, so that the lower ends of the ring supports 134 and 136 are coupled for pivoting movement with respect to the lower section 148 of the U-shaped bar 132. The protrusions 196+208, the protrusions 198+210, and the pivot shafts 216, 218 experience independent circular motion with respect to each other.

Referring now to FIGS. 4-6 and 12-13, the assembly 20 includes a pump system that functions to pump the bubble solution from the solution bottle 32 to the bubble rings 110, 112. The pump system includes the motor 50, the tube 46, the tubings 131, 133, a guide wall 248, and a gear system that functions to draw bubble solution through the tube 46 and tubings 131, 133. The gear system includes a motor gear 250 that is rotatably coupled to a shaft 252 of the motor 50, a gear housing plate 254, a first gear 256, a second gear 258, a resilient element 260 (such as a spring), two pressure rollers 262, 264, and a shaft 266. The motor gear 250 has teeth that are engaged with the teeth of the first gear 256. The first gear 256 is rotatably coupled to the gear housing plate 254, and has teeth that are engaged with the teeth of the second gear 258. The second gear 258 rotates about an axis defined by the shaft 266, and the resilient element 260 is carried on the shaft 266 between the second gear 258 and an enlarged end of the shaft 266. The pressure rollers 262, 264 are spaced apart along the outer periphery of the second gear 258 and positioned to face away from the gear housing plate 254. Referring also to FIGS. 12 and 13, each pressure roller 262, 264 has a base section 280 and an upper section 282 which has a smaller diameter than the diameter of the base section 280. The gear housing plate 254 has an opening 268 along one side through which a guide element 270 (e.g., a screw) is fitted. The second gear 258 is positioned adjacent the push button 66, with a portion of the stepped extension 76 of the push button 66 extending into the path of the tube 46 between the second gear 258 and the gear housing plate 254 (see FIGS. 12 and 13). In particular, the tube 46 extends from the interior of the solution bottle 32, through the opening 44 in the solution dish 40, into the housing 22, and passes through a path (that is defined by the guide element 270, the pressure rollers 262, 264, and the guide wall 248) that leads to a branch 272 from where the tubings 131, 133 extend. At the location of the guide element 270, the pressure rollers 262, 264, and the guide wall 248, the tube 46 is positioned between the second gear 258 and the guide wall 248.

The pump system operates in the following manner. When the motor 50 is actuated, the motor gear 250 will rotate, thereby causing the first and second gears 256 and 258 to rotate as well. As the second gear 258 rotates, the pressure rollers 262, 264 will rotate as well. As the pressure rollers 262, 264 rotate, they will apply selected pressure on different parts of the tube 46 in the manner described below.

The assembly 20 operates in the following manner. In the normal non-operational condition (i.e., when the rings 110, 112 are contacting each other in the closed position as shown in FIGS. 1, 4 and 8), the push button 66 is normally biased outwardly away from the housing 22 by the resilient element 70 (as explained above). When the user presses the push button 66 (see FIGS. 2, 5 and 9), the push button 66 pivots clockwise about the shaft 86 (in the orientation shown in FIGS. 4 and 5), which causes three sequences of events occur at about the same time.

First, the bubble rings 110, 112 are moved from their closed position to their opened position. As best shown by comparing FIGS. 8 and 9, the bar 88 of the push button 66 is pivoted in a clockwise direction so that the sliding shaft 92 is pushed upwardly within the groove 94. The upward movement of the sliding shaft 92 pushes the locking piece 96 rearwardly along the locking rack 98 in the direction of arrow R, thereby overcoming the normal bias of the resilient element 70. As the bar 88 is pivoted in the clockwise direction, the bar 88 pulls the control bar 130 rearwardly in the direction of arrow R because the bar 88 is seated inside the groove 150 of the control bar 130. Rearward movement of the control bar 130 will pull the U-shaped pivoting bar 132 rearwardly in the direction of arrow R. Since the pivot axis defined by the pivot shafts 216 and 218 is fixed, rearward movement of the pivoting bar 132 will cause the ring supports 134 and 136 to pivot about the pivot axis defined by the pivot shafts 216, 218 when the protrusions 196, 198, 208, 210 slide back and forth within the elongated openings 162, 172, 164, 174, respectively (see FIGS. 10 and 11), so as to pivot the ring supports 134, 136 (and their bubble rings 110, 112) from the closed position to the opened position, where the openings of the bubble rings 110, 112 (and the formed films of bubble solution) will be directly facing an air generator 300.

The back and forth sliding motion of the protrusions 196, 198, 208, 210 within the elongated openings 162, 172, 164, 174, respectively, can be described as follows: when the two rings 110, 112 contact each other in the position shown in FIG. 10, the protrusions 196, 198, 208, 210 are positioned at the inner ends of a

respective elongated opening 162, 172, 164, 174. As the pivoting bar 132 causes the ring supports 134 and 136 to pivot about the pivot axis defined by the pivot shafts 216, 218, the rings 110, 112 will move apart from each other. As the rings 110, 112 move apart from each other, the protrusions 196, 198, 208, 210 will slide from the inner ends to the outer ends of the respective elongated opening 162, 172, 164, 174. When the protrusions 196, 198, 208, 210 reach the outer ends of the respective elongated opening 162, 172, 164, 174, the rings 110, 112 will be about ninety degrees apart from other, and further pivoting by the ring supports 134, 136 will cause the protrusions 196, 198, 208, 210 will slide from the outer ends to the inner ends of the respective elongated opening 162, 172, 164, 174. When the protrusions 196, 198, 208, 210 reach the inner ends of the respective elongated opening 162, 172, 164, 174 again, the rings 110, 112 will be about one hundred and eighty degrees apart from other, as shown in FIG. 11.

Second, bubble solution is pumped to the bubble rings 110, 112. In this regard, the clockwise pivot of the push button 66 causes the second contact 60 to engage the third contact 64, thereby forming a closed electrical circuit that will deliver power from the power source 48 to the motor 50. The motor 50 will turn on, thereby causing the motor gear 250 to drive and rotate the first and second gears 256 and 258. As the pressure rollers 262, 264 on the second gear 258 rotate, they will apply selected pressure on different parts of the tube 46. FIGS. 12 and 13 illustrate this in greater detail. FIG. 12 illustrates the relationship between the pressure rollers 262, 264 and the tube 46 when the assembly 20 is in the normal non-operational condition (i.e., when the rings 110, 112 are contacting each other in the closed position as shown in FIGS. 1, 4 and 8), and FIG. 13 illustrates the relationship between the pressure rollers 262, 264 and the tube 46 when the assembly 20 is in the bubble-generating position (i.e., when the rings 110, 112 are side-by-side in the opened position as shown in FIGS. 2, 5 and 9). As shown in FIG. 12, the tube 46 is normally fitted between the smaller-diameter upper section 282 of the pressure rollers 262, 264 and the guide wall 248, and the lower edge 78 of the stepped extension 76 of the push button 66 is fitted between the second gear 258 and the gear housing plate 254. The resilient element 260 normally biases the second gear 258 towards the gear housing plate 254. When the push button 66 is pressed and pivoted, the stepped extension 76 is pressed inside the space between the second gear 258 and the gear housing plate 254, overcoming the normal bias of the resilient

element 260 and causing the second gear 258 to slide along the angled edge 82 to increase the distance between the second gear 258 and the gear housing plate 254. As the second gear 258 moves away from the gear housing plate 254 towards the guide wall 248, the pressure rollers 262, 264 are pushed into the tube 46 so that the tube 46 is now positioned between the guide wall 248 and the larger-diameter base section 280 of the pressure rollers 262, 264, thereby compressing the tube 46 as shown in FIG. 13. Thus, rotation of the pressure rollers 262, 264 will compress different portions of the tube 46, thereby creating air pressure to draw the bubble solution from the interior of the solution bottle 32 through the tube 46, on to the tubings 131 and 133, and then into the chambers 118 of the bubble rings 110, 112, where the bubble solution will bleed out through the outlets 124 on to the front surfaces 126 of the bubble rings 110, 112.

This arrangement and structure of the pressure rollers 262, 264 is effective in prolonging the useful life of the tube 46 and the pump system. In particular, the pressure rollers 262, 264 only apply pressure against the tube 46 when the push button 66 is actuated (i.e., the larger-diameter base section 280 only compresses the tube 46 when the push button 66 is pressed), so that the tube 46 does not experience any pressure when the push button 66 is not actuated (i.e., the smaller-diameter upper section 282 is positioned adjacent to, but does not compress, the tube 46 when the push button 66 is not pressed). This is to be contrasted with conventional pump systems used for pumping bubble solution to a bubble producing device, where pressure is always applied to the tube regardless of whether the trigger or button is actuated. Over a long period of time, this constant pressure will deform the tube, making it difficult for bubble solution to be drawn through the tube.

Third, the air generator 300 (such as a fan which extends outside the housing 22) that is secured to the motor 50 is actuated when the motor 50 is turned on. In this regard, the clockwise pivot of the push button 66 causes the second contact 60 to engage the third contact 64, thereby forming a closed electrical circuit that will deliver power from the power source 48 to the motor 50 to rotate the air generator 300. The air generator 300 blows a stream of air towards the bubble rings 110, 112. This stream of air will then travel through the film of bubble solution that have been formed over the bubble rings 110, 112, thereby creating bubbles.

Thus, pressing the push button 66 will actuate the air generator 300, and will cause the bubble rings 110, 112 to be positioned side-by-side to face the air

generator 300 so that bubbles can be created. Pressing the push button 66 will also pump bubble solution from the solution bottle 32 to the bubble rings 110, 112.

When the user releases his or her pressing grip on the push button 66, the resilient element 70 will normally bias the locking piece 96 towards the front end 100 of the locking rack 98, thereby pivoting the push button 66 in a counter-clockwise direction (as viewed from the orientation of FIGS. 4 and 5) about the pivot shaft 86, biasing the push button 66 outwardly away from the housing 22. This will cause the second contact 60 carried on the push button 66 to be biased away from the third contact 64 so that power to the motor 50 is cut. As a result, the air generator 300 will stop producing streams of air, and the pump system will stop drawing bubble solution from the solution bottle 32 to the bubble rings 110, 112. In addition, the bar 88 will push the control bar 130 in a forward direction (opposite to the direction of arrow R), thereby pushing the U-shaped pivoting bar 132 forwardly as well. Since the pivot axis defined by the pivot shafts 216 and 218 are fixed, forward movement of the pivoting bar 132 will cause the ring supports 134 and 136 to pivot about the pivot axes defined by the protrusions 196+198 and 208+210 (in a reverse manner from that described above for the back and forth motion of the protrusions 196, 198, 208, 210 within the elongated openings 162, 172, 164, 174, respectively), so as to pivot the ring supports 134, 136 (and their bubble rings 110, 112) from the opened position of FIGS. 2, 5 and 9 to the closed position of FIGS. 1, 4 and 8.

In addition, as best shown in FIGS. 4 and 5, the solution dish 40 is positioned directly below the bubble rings 110, 112 to collect any stray droplets of bubble solution that drip from the bubble rings 110, 112. These stray droplets can flow back into the solution bottle 32 via the opening 42. In addition, the solution bottle 32 can be removed from the housing 22 by threadably disengaging the neck of the solution bottle 32 from the connecting section 34.

FIG. 14 illustrates another bubble generating assembly 20a according to the present invention. The assembly 20a differs from the assembly 20 of FIGS. 1-13 in that two sets of two bubble rings 110a+110b and 112a+112b are provided instead of just two bubble rings 110, 112. For this reason, most of the elements in the assembly 20a of FIG. 14 are identical to the same elements in the assembly 20 of FIGS. 1-13, and will not be described herein. The elements in the assemblies 20 and 20a that are identical will be designated by the same numeral designations, except that an "a" will be added to the designations in FIG. 14. The following

description will only highlight the differences between the assemblies 20 and 20a.

The assembly 20a differs from the assembly 20 of FIGS. 1-13 in that two sets of two bubble rings 110a+110b and 112a+112b are provided instead of just two bubble rings 110, 112. To facilitate this modification, two motors 50a and 50b are provided and are retained inside the opening 144a (which is now elongated to accomodate the two motors 50a, 50b) in the pivoting bar 132a. In addition to the wires 52a and 56a (which are the same as the wires 52 and 56 in FIGS. 1-13), an additional wire 320 couples the two motors 50a and 50b. Each motor 50a and 50b carries a separate air generator 300a and 300b, respectively. Each ring support 134a and 136a now carries two bubble rings 110a+110b and 112a+112b, respectively. The bubble rings 110a and 110b are both attached to the outer side of the ring support 134a, and are spaced apart by a delivery tube 322. Each opposing end of the delivery tube 322 can be connected to a peripheral opening in the annular base piece (e.g., 114) of a separate bubble ring 110a and 110b. As a result, the bubble solution that has entered the annular chamber (e.g., 118) of the upper bubble ring 110a can flow through the delivery tube 322 into the annular chamber (e.g., 118) of the lower bubble ring 110b. Similarly, the bubble rings 112a and 112b are both attached to the outer side of the ring support 136a, and are spaced apart by another delivery tube 324. Each opposing end of the delivery tube 324 can be connected to a peripheral opening in the annular base piece (e.g., 114) of a separate bubble ring 112a and 112b. As a result, the bubble solution that has entered the annular chamber (e.g., 118) of the upper bubble ring 112a can flow through the delivery tube 324 into the annular chamber (e.g., 118) of the lower bubble ring 112b.

The assembly 20a operates in the same manner as the assembly 20. The only difference is that the additional bubble rings 110b, 112b will generate more bubbles.

While the description above refers to particular embodiments of the present invention, it will be understood that many modifications may be made without departing from the spirit thereof. The accompanying claims are intended to cover such modifications as would fall within the true scope and spirit of the present invention.